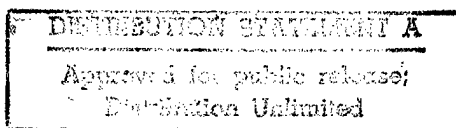




Project Status Report



Upper Mississippi River
Long Term Resource Monitoring Program
U.S. Geological Survey

Conversion of US Army Corps of Engineers Land Cover Data

by

Peter E. Joria

Periodic land cover maps of the Upper Mississippi River System (UMRS) floodplain are required by resource managers to understand and monitor the system. Typically, land cover maps for the UMRS are produced through interpretation of aerial photography and stored as geographic information system ARC/INFO coverages. True-color and color-infrared photos (scale = 1:15,000) of the entire UMRS were collected in 1989 as part of the Long Term Resource Monitoring Program (LTRMP). Nearly the entire UMRS floodplain was interpreted from these photos. The exceptions were Pools 1-3, most of the Open River (the UMRS from Lock & Dam 26 located near Alton, Illinois downstream to its confluence with the Ohio River near Cairo, Illinois), and about half of the Illinois River. Sections of the UMRS have been re-photographed and interpreted in subsequent years, but the same gaps in coverage remain. In an effort to fill these gaps, land cover data for the Open River were acquired by the U. S. Army Corps of Engineers (USACE) to incorporate into their River Engineering and Environmental Geospatial Information System (REEGIS, Figure). Recently, a conversion routine was developed by Environmental Management Technical Center staff to translate REEGIS data from Intergraph Design files to ARC/INFO coverages.

The Lower Mississippi Division of the USACE formed a River Database Working Group in November of 1992, with the task of developing a comprehensive geospatial database of the lower Mississippi and its tributaries. The resulting REEGIS database brought together twenty-eight existing thematic layers including flood control structures, geology, hydrography and land cover.



Figure. The River Engineering and Environmental Geospatial Information System (REEGIS) land cover linework for the Whitney quadrangle of the Open River displayed over a Landsat Thematic Mapper satellite image.

(over)

The REEGIS land cover for the leveed floodplain of the Lower Mississippi River exists as 50-meter resolution raster files for 1982 and 1992 and as a vector file for 1994. The 1994 layer was interpreted from 1:24,000 scale panchromatic aerial photographs, with a minimum mapping unit (MMU) of 5 acres for wetlands and 20 acres for non-wetlands.

The primary software used in REEGIS is Intergraph's Modular GIS Environment (MGE). The MGE stores each data layer as a design (*.dgn) file of graphic elements (e.g., polygons with labels at their centroids) and an associated attribute table or tables within a relational database. Each graphic feature in the design file is linked to a specific record in the table(s). While Intergraph design files may support up to 64 separate graphic levels, REEGIS is organized so that only one theme is contained in each *.dgn file.

The 1994 land cover for the St. Louis District was acquired as a single, seamless vector file (fwland94.dgn) and associated attribute data file (fwland94.dmp). The following basic guidelines were used to convert the 1994 land cover layer to an ARC/INFO coverage. These steps may not be exactly the same for all REEGIS conversions. For more information, consult the ARC/INFO on-line help for the commands "IGDSINFO" and "IGDSARC," as well as on-line help under "Contents>Data Automation>Data Conversion>Converting IGDS data." The author will provide a more detailed explanation of the conversion, including examples of command usage, upon request.

Basic guidelines for file conversion:

- 1) Determine the element Levels and Types in the IGDS file, using IGDSINFO. Your data source should also be able to provide this information. "Levels" correspond to graphic layers in the IGDS file. "Types" refer to the kind of element (e.g., cell, line, shape).
- 2) Convert the levels of interest in the graphic file from design format to an ARC/INFO coverage, using IGDSARC. Note that REEGIS files should be identified as 3D, though (in this instance) the z-value is set to zero. Wildcards (*) should be used in the subcommands, so that IGDSARC can substitute appropriate values from the design file. Only the layer name and layer number need to be specified.
- 3) Use the CLEAN command to build polygon topology and set the "fuzzy tolerance." The fuzzy tolerance determines how vertices, or changes in directions along lines, are treated in the conversion. It is important to set a low (e.g., "1") fuzzy tolerance because of the small MMU of these coverages. If the fuzzy tolerance is not low enough, lines may shift and centroids end up

outside their polygons, resulting in label errors. The REEGIS data should have correct line work, with one label per polygon.

Linking Attributes:

- 1) Convert the attribute file to an INFO file. The REEGIS provides element attributes in a separate, data-dump (*.dmp) file. The file consists of a header followed by the actual data records. Bring the file into a word processor or text editor, delete the header, and replace the spaces between fields with a single comma, creating a comma-delimited ascii file.
- 2) In ARC/INFO, define an INFO file (e.g., fwland94_3d.asc) corresponding to the fields in the ascii file, then add the records from the ascii file into the INFO file.
- 3) Restore the links between graphic features and their attributes. The command IGDSARC creates several INFO files, including a file named *.dmrs. The *.dmrs file provides a bridge between the polygon attribute table (*.pat) for the graphic features and their extended attributes (in the *.asc file just created). The item "[cover]-ID" in the *.dmrs file links back to the same item in *.pat, and another item ("OCCUR") in the *.dmrs file forward to the item "MSLINK" in the file *.asc. The item "MSLINK" first must be added to the *.dmrs file, and its value calculated from the item "OCCUR". Then the *.asc file can be joined to the *.dmrs, which in turn is joined to the *.pat. The result is a fully-attributed ARC/INFO coverage.

Additional work is required to fully integrate non-program data such as REEGIS with the LTRMP database. Spatial and thematic accuracy standards must be met. To the extent possible, the land cover schemes must be "cross-walked" so that REEGIS categories can be re-classed into their equivalent LTRMP categories. When this work is completed, the 1994 REEGIS land cover data will be made available to the LTRMP community. With some modification, this routine may also be used to convert other themes within the REEGIS database into a format compatible with LTRMP data. □

For further information, contact

Peter E. Joria
U.S. Geological Survey
Environmental Management Technical Center
575 Lester Avenue
Anchorage, Alaska 99506
Phone: 907/783-7550, ext. 703
E-mail: pete_joria@usgs.gov

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907/783-7550